REMARKS

Claims 6-18 are currently pending. The specification has been amended at pages 7 and 10. Replacement drawings are being submitted herewith, which present changes to Figures 15-18. Reconsideration is respectfully requested.

The Office Action includes an objection to Figures 15-19. The Office Action states that these figures should be labeled by a legend such as "Prior Art". As reflected in the accompanying Replacement Sheets, Figures 15-18 have been changed to include the legend "Conventional". Applicant notes that Figure 19 does not represent conventional technology, but rather pertains to the first disclosed embodiment of the invention. See, for example, page 7, lines 18-20, and page 12, lines 17ff. Accordingly, Figure 19 has not been revised, and the specification has been corrected at page 7, lines 10-12, to avoid any confusion. Withdrawal of the objection is respectfully requested.

The Office Action includes an objection to Figure 4 because it does not include a reference sign for position "D" referred to at page 10 of the description. Position D is reflected in Figure 5, and the specification has been amended at page 10 to point this out. Withdrawal of the objection is respectfully requested.

The Office Action includes a rejection of claims 6-17 under 35 U.S.C. §102(b) as being anticipated by the *Hasegawa et al.* patent (U.S. Patent No. 5,715,043). This rejection is respectfully traversed.

Claims 6 and 9 each recite, *inter alia*, a first area sensor having sensing elements disposed two-dimensionally and a second area sensor having sensing elements disposed two-dimensionally for receiving light of the first and second object images, respectively. In the April 30, 2002 and January 21, 2003 Amendments, Applicant submitted that the *Hasegawa et al.* patent did not disclose area sensors. In particular, Applicant pointed out that the term "area sensor" is a term of art known by those of ordinary skill in the art to refer to a sensor having sensing elements arranged in two dimensions (see, e.g., present specification at page 18, lines 7-9). In contrast, "line sensors" are understood by those of ordinary skill in the art to have sensing elements arranged in one dimension (along a line).

As noted in paragraph 8 of the Office Action, the rejection has been changed relative to the previous Office Action, to point to a different embodiment of the Hasegawa et al. patent -- namely, the embodiment illustrated in Figures 17-21 therein. In this regard, the rejection alleges that the two line sensors 4Lα and 4Lβ shown in Figure 17 of the Hasegawa et al. patent together constitute a first area sensor, and that the two line sensors 4Rα and 4Rβ together constitute a second area sensor.

Applicant respectfully submits that a person of ordinary skill in the art would not consider the four line sensors illustrated in Figures 17-20 of the Hasegawa et al. patent to constitute two area sensors. First, at column 22, lines 15-17, the Hasegawa et al. patent explicitly states, "The sensor chip 4 has four line sensors 4Lα, 4Lβ, 4Rα and 4Rβ." In addition, one of ordinary skill in the art would recognize differences between an area sensor and a pair of line sensors. For example, the sensing elements of one line sensor are

not arranged as a unit together with the sensing elements of another line sensor. In contrast, all the sensing elements of an area sensor are arranged as a unit. In addition, two line sensors require two sets of electrical connections (one set for each line sensor). In contrast, one area sensor requires only one set of electrical connections. Accordingly, for at least these reasons, Applicant submits that the four line sensors illustrated in Figures 17-20 of the Hasegawa et al. patent do not constitute two area sensors. Withdrawal of the rejection and allowance of claims 6 and 9 are respectfully requested. Claims 7 and 8 depend from claim 6, and claim 10 depends from claim 9. Claims 7, 8 and 10 are therefore allowable at least by virtue of dependency.

Independent claim 15 recites an image sensing device comprising, *inter alia*, an area sensor having sensing elements disposed two-dimensionally for receiving light of an object image. Accordingly, claim 15 is not anticipated by the *Hasegawa et al.* patent at least for reasons similar to those set forth above for claims 6 and 9. Accordingly, withdrawal of the rejection and allowance of claim 15 is respectfully requested. Claims 16 and 17 depend from claim 15, and these claims are therefore allowable at least by virtue of dependency.

Independent claim 11 recites an image sensing device comprising an optical system having a single optical axis for forming an object image, a first sensor array arranged in the approximate image forming plane of the optical system for receiving light of the object image, and a second sensor array arranged in the approximate image forming plane of the optical system for receiving light of the object image. The image sensing device also comprises a signal reader for reading a first photoreception signal series from said first

sensor array and a second photoreception signal series from said second sensor array. Further, the image sensing device comprises a position detector for detecting an image interval by directly comparing the second photoreception signal series and the first photoreception signal series. The image sensing device also comprises an angle detector for detecting the magnitude of an angle of the object image relative to an axis of one of said sensor arrays based on the detected image interval. In other words, both the first and second sensor arrays are arranged at an approximate image forming plane of the same optical system having a single optical axis. In addition, the image interval is determined by directly comparing the signals from the two sensor arrays that receive light from the same object image that is formed using the optical system having a single optical axis. Support for the change to claim 11 may be found at least at page 23, line 21 through page 25, line 9 of the Description. As noted at page 24, lines 3-7, the image interval can be calculated, for example, by calculating a correlation coefficient, such as illustrated in Figure 5. Of course, claim 11 is not intended to be limited to this example.

In contrast, the arrangement illustrated in Figures 2 and 17-21 of the Hasegawa et al. patent does not determine an image interval by directly comparing signals obtained from two sensor arrays that receive light from the same object image formed using an optical system having a single optical axis. Rather, to determine an image distance (phase difference), the Hasegawa et al. patent discloses comparing signals from sensor arrays that correspond to two different optical systems that produce two images (see Figures 2, 17 and 20, and column 22, lines 40-54, and column 25, line 63 through column 26, line 24

therein). In particular, Figure 20 of the Hasegawa et al. patent illustrates that signals from right and left sensors 4Rβ and 4Lβ, corresponding to different lenses 1R and 1L, respectively, are input into the same phase difference detection circuit 40β (and similarly for signals input into phase difference detection circuit 40α). Accordingly, the Hasegawa et al. patent does not disclose directly comparing signals obtained from two sensor arrays that receive light from the same object image formed using an optical system having a single optical axis. Claim 11 is not anticipated by the Hasegawa et al. patent for at least these reasons. Withdrawal of the rejection and allowance of claim 11 are respectfully requested. Claims 12-14 and 18 are allowable at least by virtue of dependency.

In light of the foregoing remarks, withdrawal of the objections and rejections of record and allowance of this application are respectfully solicited. Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: _____

James A. LaBarre
Registration No. 28,632

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: July 16, 2003

Attachment to Amendment

Marked-up Paragraph at page 7, lines 8-12:

FIGS. 15(a), 15(b) and 17 show a construction of a conventional distance measuring device; [and]

FIGS. 16(a), 16(b) and 18 [and 19] show the dislocation of the optical system and sensor layouts in the distance measuring device of FIG. 15(a); and

FIG. 19 illustrates the image-forming condition on the sensor of the first embodiment.

Marked-up Paragraph at page 10, lines 11-22:

The image interval X is determined based on the position D illustrated in FIG. 5 at which the value of the correlation coefficient series f(i) is minimum. Since the correlation coefficient series f(i) is an intermittent value for each predetermined interval (i.e., an integer multiple of the interval p), the position D of the reference part M most closely matching the standard part N can be determined by appropriate interpolation via well-known methods using the smallest correlation coefficient, e.g., f(5), included between a plurality of correlation coefficients, e.g., f(3)-f(7), and [thereby calculate] a more detailed image interval X can thereby be calculated.

Attachment to Amendment

Marked-up Claim 11

11. (Three Times Amended) An image sensing device comprising:

an optical system having a single optical axis for forming an object image;

a first sensor array arranged in the approximate image forming plane of the optical system for receiving light of the object image;

a second sensor array arranged in the approximate image forming plane of the optical system for receiving light of the object image;

a signal reader for reading a first photoreception signal series from said first sensor array and a second photoreception signal series from said second sensor array;

a position detector for detecting an image interval [based upon] by directly comparing the second photoreception signal series and the first photoreception signal series; and

an angle detector for detecting a magnitude of an angle of the object image relative to an axis of one of said sensor arrays based on the detected image interval.